PPOs – Informing the future
Emma Potter – Towers Watson – Deputy Chair
Keith Brown – AXA
Agenda

• Background

• PPO models
  – Thinking outside the triangle

• Key assumptions
  – Inflation
  – Discounting
  – Mortality

• Conclusion
Note

• The views and opinions expressed in this paper are those held by the authors individually and do not represent the views and opinions of their employers or the Institute and Faculty of Actuaries.

• Although we have used our best efforts, no warranty is given about the accuracy of the information and no liability can be accepted for anybody relying on the accuracy of the information or following the recommendations in this presentation.

These slides were presented at CIGI 2015. They represent views from the perspective of insurers, not reinsurers, although some of the same considerations apply.

If you have any questions, please contact Kimberly Hutton at the IFoA who will be able to put you in touch with the PPO Working Party members.
Background
Periodical Payment Orders (PPOs)

A PPO is a contingent, deferred, whole-life, wage inflation linked, guaranteed, impaired annuity, where the identity of the annuitant and the size of the annual payments are unknown at inception.

Source: PPO Working Party internal communication

22 April 2015
2015 Workstreams

- Mortality – UK
- Mortality – Australian
- Reinsurance
- Market Solution
- Bodily injury almanac
- PPO Information Paper
- Industry Survey
- Legal interviews

22 April 2015
PPO Information Paper

• A workstream in the Working Party is the production of a non-prescriptive paper giving information on key considerations for PPO valuation

• Look out for the forthcoming paper planned Summer 2015

Unwinding

Communicating uncertainty

Propensity

Reinsurance

Valuation techniques

Data requirements

Setting assumptions

Reporting bases

Unhedgeable inflation

Discount rate

Stress testing

Stochastic methods

22 April 2015
2014 PPO Working Party Survey

• Survey taken as at 31 December 2013
  – 398 Motor PPOs, 45 Liability PPOs
  – Insurers surveyed cover >90% of PRA regulated market

• Can be used for:
  – Benchmarking
  – Observing industry trends

• Look out for full report to be published Spring 2015
PPO models
A focus on reserving

22 April 2015
Actuaries ♥ Triangles
Triangles fail us for PPO numbers

- Triangles can only work well, where the past pattern is a good estimate to the future
  - PPOs show calendar year effects, with limited numbers of structured settlements before the 2003 Courts Act introduced PPOs
  - Then they only really take off in 2009, after Thompstone v Tameside replaced RPI with ASHE and the economy entered its current state
  - They typically take over five years to settle
- So the whole industry’s claims don’t have a reliable pattern for numbers
- Then there’s the question of scanty data in individual firms
Changing PPO numbers over time

Number of PPOs by Settlement Year

- Number of PPO settlements 32% lower in 2013 compared to 2012
Triangles don’t help for PPO amounts

• What would be projected in a triangle:
  – Inflation
  – Mortality
  – Steps in payment steams
  – Variation orders being activated

• For most of these the past will not be a good guide to the future for some time, if at all

• And, your triangle will end but the annuities will keep getting paid
  – Tail factor of death… (well maybe survival is more technically correct)
Think outside the triangle

• One problem, many solutions

• Cash flow approach for settled PPOs
  – Solvency II requires the use of life techniques
  – No one uses stochastic elements for reserving settled claims
    • 8 Probabilistic
    • 5 Annuity-certain

• Variety of approaches to future IBNR PPOs and “pure IBNR” PPOs
  – Loadings
  – Frequency-severity method
  – Probability weighting of potential PPOs using cash flow approach
An uplifting approach

• The difference between what is in your triangle and your PPO valuation.

• But how well do you know your triangle?
  – What exactly is in your incurred triangles?
    • Discount rate assumptions
  – How do PPOs impact your large claims projections?
  – How are you going to treat PPOs in your paid triangles?
Key assumptions
Inflation and discounting
What inflation is being modelled

• PPOs are subject to two key sources of inflation
  – Court inflation affecting the average size of the annual payment over time
  – The measure used to index the claim
Changing PPO amounts over time...

![Graph showing average lump sum and initial PPO amount over time from 2009 to 2013. The graph indicates a general increase in both lump sum and initial annual payment amounts over the years, with a notable peak in 2013.](image)

PPOWP 2014 Survey
Inflation of PPO payments: ASHE & RPI

Number of Motor PPOs by Settlement Quarter split by Indexation

- ASHE
- RPI

Settlement Quarter

Q2 2005 to Q4 2013

Thompstone v Thameside
Thompstone v Thameside Appeal Lost
The majority of PPOs in the market are linked to ASHE 6115. Those that aren’t tend to be in respect of heads of damage other than the cost of care.

### Inflation of PPO payments: All indices

<table>
<thead>
<tr>
<th>All Heads of Damage</th>
<th>ASHE 6115</th>
<th>ASHE Other</th>
<th>RPI</th>
<th>Not Indexed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Care</td>
<td>357</td>
<td>1</td>
<td>0</td>
<td>17</td>
<td>375</td>
</tr>
<tr>
<td>Loss of Earnings</td>
<td>5</td>
<td>13</td>
<td>3</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>Case Management</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Rent/Accommodation</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0</td>
<td>10</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>NA/Missing</td>
<td>17</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>380</strong></td>
<td><strong>14</strong></td>
<td><strong>17</strong></td>
<td><strong>22</strong></td>
<td><strong>433</strong></td>
</tr>
</tbody>
</table>
## What is ASHE 6115?

- **Pre-2011:** In Table 14.5a, before the split into codes 6145 and 6146

### Table 14.5a Hourly pay - Gross (£) - For all employee jobs: United Kingdom, 2010

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
<th>Number of jobs (thousand)</th>
<th>Median</th>
<th>Annual percentage change</th>
<th>Mean</th>
<th>Annual percentage change</th>
<th>Percentiles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Personal service occupations</strong></td>
<td>6</td>
<td>2,210</td>
<td>8.26</td>
<td>1.4</td>
<td>8.94</td>
<td>0.5</td>
<td>6.06  6.65  6.92  7.16  7.69  8.89  9.68  10.12  10.70  12.34</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Caring personal service occupations</strong></td>
<td>61</td>
<td>1,792</td>
<td>8.28</td>
<td>1.3</td>
<td>8.81</td>
<td>1.1</td>
<td>6.14  6.72  6.98  7.20  7.73  8.88  9.63  10.06  10.57  12.06</td>
</tr>
</tbody>
</table>

- **Ambulance staff (excluding paramedics)**
  - Code: 6112
  - Median: 10.54
  - Annual percentage change: 1.4
  - Mean: 11.32
  - Annual percentage change: -0.1
  - Percentiles: 7.70  8.57  8.81  9.11  9.70  11.73  13.25  13.84  14.13  x

- **Dental nurses**
  - Code: 6113
  - Median: 8.69
  - Annual percentage change: -0.7
  - Mean: 8.82
  - Annual percentage change: -0.3
  - Percentiles: 6.50  7.15  7.38  7.68  8.13  9.37  9.85  10.06  10.20  x

- **Houseparents and residential wardens**
  - Code: 6114
  - Median: 9.78
  - Annual percentage change: -2.8
  - Mean: 10.37
  - Annual percentage change: -2.2
  - Percentiles: 6.59  7.44  7.92  8.34  8.96  10.49  11.46  12.16  12.80  x

- **Care assistants and home carers**
  - Code: 6115
  - Median: 8.07
  - Annual percentage change: 1.8
  - Mean: 8.64
  - Annual percentage change: 0.8
  - Percentiles: 6.06  6.55  6.80  7.04  7.50  8.70  9.45  9.91  10.44  12.16

- **Childcare And Related Personal Services**
  - Code: 6121
  - Median: 7.89
  - Annual percentage change: 0.7
  - Mean: 8.49
  - Annual percentage change: 1.0

- **Nursery nurses**
  - Code: 6121
  - Median: 7.38
  - Annual percentage change: 1.6
  - Mean: 8.14
  - Annual percentage change: 1.2
  - Percentiles: 5.80  6.00  6.13  6.31  6.79  8.32  9.43  10.05  10.49  11.44

### Post-2011: 6115 equivalency continuing to be produced by the ONS under Table 26.5a

### Table 26.5a Hourly pay - Gross (£) - For all employee jobs: United Kingdom, 2013

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
<th>Number of jobs (thousand)</th>
<th>Median</th>
<th>Annual percentage change</th>
<th>Mean</th>
<th>Annual percentage change</th>
<th>Percentiles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Care workers, home carers and senior care workers</strong></td>
<td></td>
<td>748</td>
<td>7.91</td>
<td>0.0</td>
<td>8.58</td>
<td>0.1</td>
<td>6.30  6.61  6.80  7.00  7.40  8.50  9.22  9.73  10.29  12.02</td>
</tr>
</tbody>
</table>

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ASHE to ASHE

Distribution of ASHE 6115 Percentiles by Settlement Year

• The majority of recently settled PPOs are linked to the 80th percentile of ASHE 6115
Choosing an inflation assumption

• ASHE based securities are currently very rare
  – Consequently a standard market-consistent curve of inflation for ASHE cannot be produced, though there is still a need in models for an assumption of future inflation

• Could consider three frames of reference
  – What has happened historically?
  – What’s the current outlook for RPI (which has a market view) and how does ASHE link to it?
  – Future outlook, is there constraints such as inflation targets or structural changes in the economy expected?

• A failure to treat investment return and inflation consistently will seriously jeopardise the robustness of any model output
Historical inflation

- Link between ASHE 6115 and RPI difficult to see unless broken down into steps
- Even then this is challenging as the history is short and changing environment
Historical inflation

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![Inflation measures over time](image-url)
Historical inflation

- Link between ASHE 6115 and RPI difficult to see unless broken down into steps
- Even then this is challenging as the history is short and changing environment
Inflation (ASHE) assumptions

• Insurers surveyed used a used long term ASHE assumption for discounting PPO reserve cash flows of between 3% and 4.5%

• The most commonly used assumption was 4%

![Bar chart showing the distribution of ASHE inflation rate assumptions among insurers.](chart.png)
Choosing investment return rates

• You may be constrained by the reporting basis, and it’s a good idea to research these (Solvency II doesn’t supersede all of them)

• For economic rates, again one could consider three frames of reference
  – What are past rates of long-dated government bonds and assets of similar nature to PPOs?
  – What is the current market-based yield curves for assets backing the liabilities?
  – What a future long-term expectations for assets backing the PPOs?

• Again to avoid a misleading outcome – the investment return and inflation should be set considering each other
Investment return assumptions

• The investment return assumed by the surveyed insurers for discounting their PPO reserves varied between 3% and 5.5%

• Appropriate rates depend on the insurers’ investment strategies
  – Matching duration of assets to PPO liabilities
  – Holding specific assets to back PPO liabilities
Real discount rate assumptions

Most set investment discount rate assumption and ASHE inflation assumptions explicitly

- But check the implied net position of the real discount rate is appropriate
Impact of real discount rate

- The real discount rate assumption has a large impact on the size of the discounted PPO reserves and total cost.
- This is what makes the expected cost of a PPO greater than the cost of a Ogden-based settlement at the current 2.5% discount rate.

### Size of PPO Reserves at different Real Discount Rates

<table>
<thead>
<tr>
<th>Assumed real discount rate</th>
<th>Real Discount Rate</th>
<th>PPO Total Cost Multiplier compared to 2.5% real discount</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5%</td>
<td>-2.0%</td>
<td>2.02</td>
</tr>
<tr>
<td>2.0%</td>
<td>-1.0%</td>
<td>1.64</td>
</tr>
<tr>
<td>1.0%</td>
<td>0.0%</td>
<td>1.38</td>
</tr>
<tr>
<td>0.0%</td>
<td>1.0%</td>
<td>1.19</td>
</tr>
<tr>
<td>-1.0%</td>
<td>2.0%</td>
<td>1.06</td>
</tr>
<tr>
<td>-2.0%</td>
<td>2.5%</td>
<td>1.00</td>
</tr>
</tbody>
</table>

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Key assumptions

Mortality
Allowing for mortality

• There are not yet any available mortality tables that link to impaired lives of PPO claimants

• Could choose a single age of death (annuity certain) or adjust another life table

• Using life tables allows realistic cash flow projections that may be useful for Asset-Liability Modelling

• To adjust tables, the claimant’s future life expectancy is needed and a suitable base table

• Life expectancy is often supplied during the course of exploring lump sum settlements by medical experts
Adjusting for impairments

- For probabilistic cash flow approaches survival probabilities are required
  - Should consider impact of claimant’s impairment on future life expectancy

- Adjustment options:
  - Multiplicative scaling
  - Additive adjustment
  - Aging
The impact of impairment on mortality

Distribution of Reduction in Life Expectancy by Injury Type

Reduction in Life Expectancy as % of Unimpaired

% of PPOs by Injury Type

Brain
Spinal

PPOWP 2014 Survey
Reserving assumptions – mortality

• Most insurers factor in medical expert opinions to set the life expectancy assumption of PPO claimants
  – To allow for impairment impact in individual circumstances
  – Longevity improvements?

• All use ONS tables, either Ogden 7 or underlying tables series
  – 6 Aging adjustment
  – 2 Multiplicative scaling adjustment
Expecting the unexpected

• PPO valuations benefit greatly from stress and scenario testing as they are highly uncertain.
• The basis for PPO mortality will be unknown for decades and its useful to explore the financial impacts of how wrong estimates can be.
• Also, for PPO mortality there are scenarios that aggregate risk and are unique.
• For example what is the impact of spinal injuries being repairable and life expectancy returning closer to standard lives.
• What if brain injury treatment improved instead, or at the same time?
New Working Party Injury Categorisation

• Two dimensional injury classification system identified with claims professionals last year
  – Brain, Spinal, Amputation and other injury codes
    • (B1-6, S1-S5, A1-A4 and O1)
  – Care codes
    • (C1-C8)

• We encourage their use to help future generations assess PPO liabilities and investigate impaired life mortality

• Get involved: framework and definitions found here
  – www.actuaries.org.co.uk/practice-areas/pages/ppos

22 April 2015
Conclusions
Conclusions

• PPOs are an unusual liability which can’t be projected well using triangles alone

• Long-term views are needed of investment returns and unusual inflation references, and these should be arrived at coherently

• Applying mortality assumptions is challenging since off-the-shelf mortality tables for the type of injuries PPO claimants sustain aren’t available

• Look out for the information paper, latest survey reports and get involved by helping categorise injuries in a standard way soon
Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenters.
Questions

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Keith.S.Brown@axa-insurance.co.uk